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ABSTRACT

Focusing on variables linking fourth graders' reading comprehension and writing ability, a study investigated the (1) relationship between both free recall and comprehension probe scores in reading and analytical scale scores in writing, (2) effects of reading and writing competence on the production of story grammar categories in writing, (3) relationship between writing scores and the components of the analytic writing scale, and (4) qualitative differences in students' use of story grammar categories in both their reading recall protocols and independent writing samples. Subjects, 36 fourth graders from two Canadian schools grouped according to high, average, or low reading ability, read and responded to two passages (one with two ideally structured passages, the other with two ideally structured stories), and produced writing samples in the classroom over a 4-week period. Analyses of responses and writing samples indicated that reading comprehension and writing ability measures were significantly related; that the ability to recall story grammar elements during reading was not indicative of the ability to produce the same elements in writing; that the mechanics and story grammar category components of the analytic writing scale were the best predictors of writing quality; and that good readers and good writers, as assessed by the number of propositions recalled in reading and produced in writing samples, are not necessarily one and the same. (Twelve references are included.) (JD)

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RELATING READING & WRITING VIA COMPREHENSION, QUALITY, AND STRUCTURE

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RELATING READING & WRITING VIA COMPREHENSION.

QUALITY, AND STRUCTURE

While recently there has been an emphasis on the whole language approach, communicative competence, and process writing, the precise nature of the relationship among language components which constitute these global concepts remains obscured (Hammill & McNutt, 1981; Stotsky, 1983) and only minimal empirical evidence exists to support teaching and testing practices. Early studies examining the relationship among the language arts components were largely correlational in nature and yielded very general conclusions regarding that relationship (Stotsky, 1983). More recently, however, it has been suggested that reading and writing specifically are both processes whereby the reader or writer strives to construct meaning (Squire, 1984). This premise has permitted a more definitive analysis of the reading-writing relationship.

Kintsch and van Dijk's (1978) text analysis at the idea level has made it possible to segment text into small meaningful idea units which can be tabulated and analyzed for recall of reading comprehension, as well as for ideas produced in writing. Story grammarians have provided an overall structuring of the propositional units into basic elements of narrative text (Mandler & Johnson, 1977; Stein & Glenn, 1977). This text analysis research has provided the tools for studying the reading-writing relationship using dependent measures considering tasks of similar processing demands. Previous research reviews have concluded that the dependent measures used in studies dictated the nature and degree of the reading-writing relationship findings (Straw, 1979). Further developments in research that contributed to the clarification of the reading-writing

text (Mandler & Johnson, 1977; Stein & Glenn, 1977). This text analysis research has provided the tools for studying the reading-writing relationship using dependent measures considering tasks of similar processing demands. Previous research reviews have concluded that the dependent measures used in studies dictated the nature and degree of the reading-writing relationship findings (Straw, 1979). Further developments in research that contributed to the clarification of the reading-writing relationship emanated from the field of cognitive psychology. The proposal of schema theory (Rumelhart, 1975) and, specifically, story schema theory (Mandler & Johnson, 1977) have enabled more useful parallels to be drawn between the language user's text processing and the actual text organization. In this way the effects of text variables, content and organization, could be separated from the reader/writer variables such as prior knowledge, recall, comprehension, and structure imposed upon text.

Given that reading and writing involve a constructive process whereby meaning is created through text, along with the systematic means for text analysis and a well defined story schema theory, the reading-writing relationship can be further analyzed. The basic goal of this study was to further define the nature of the reading-writing relationship. The purpose of this research therefore was to explore a variety of variables linking fourth graders' reading comprehension and writing ability. Four main questions were addressed:

1) What is the relationship between free recall and comprehension probe scores in reading, and analytic scale scores in writing?
2) What are the effects of reading and writing competence on the production of story grammar categories in writing?

3) What is the relationship among writing scores and the components of the analytic writing scale?

4) What qualitative differences can be observed in the students' use of story grammar categories in their reading recall protocols and in their independent writing samples?

METHOD

Subjects

The subjects in this study were 36 fourth grade students from two schools in the same suburban school division in Winnipeg, Manitoba, Canada. All subjects comprising the fourth grade population of the two schools were included in the study. The high, average, and low ability grouping was determined by dividing the reading scores (PCTOT) into quartiles and then assigning those in the first quartile to the high group, those in the second and third quartiles to the average group, and those remaining to the low ability group.

Materials

Reading Assessment. The measures of reading ability were specifically designed for this study. The text consisted of two ideally-structured passages of 15 propositional units which represented all seven story grammar categories defined by Mandler and Johnson (1977). A recall analysis protocol listing the propositions was used to record both unaided and aided recall of text. Further, the score was combined to represent total comprehension and was labelled PropR. The recall analysis protocol further segmented the propositions according to the appropriate story

grammar category (i.e., initiating event, etc.)

A second measure of reading ability (COMP) involved a five item inferential comprehension probe check on the two ideally-structured stories. The Paragraph comprehension total scores (PCTOT) represented the combined PropR and COMP scores.

Writing Assessment. A three-point analytic writing scale (a modification and extension of the Glazer Writing Scale (Glazer, 1971)) was designed to assess writing quality. Components assessed in the writing scale included: Story Grammar Category, Characterization, Mechanics, Sentence Structure, Style and Word Usage.

Procedure

Data Collection. The reading assessments were conducted on an individual basis. Each subject silently read the passage, retold the story to the examiner, responded to aided recall questions for propositions not included in the initial retelling, and orally responded to the comprehension probe questions asked. The second passage was similarly presented. The sessions were audio-taped and the tapes were later transcribed and analyzed.

The writing samples were collected within the classroom setting over a period of four weeks. A pre-writing session was given prior to data collecting to familiarize the subjects with the task requirement. A writing process (think, write, edit) was modelled and practiced during this session to minimize influence of previous teaching. No reference was made to the components of the analytic scale used in the study. Once a week for the following three weeks, each subject was provided with a picture stimulus and asked to write a story relating to that picture. The samples

were collected, copied and one copy was returned to the students for sharing. The other copies were segmented into T-units and propositions. The samples were collected, copied and one copy was returned to the students for sharing. The other copies were segmented into T-units and propositions. They were then analyzed for story grammar categories. Quality ratings were done by three independent raters using the analytic writing scale (The third rater's score was used to arbitrate final decisions.). The resulting interrater reliability was calculated to be .82.

RESULTS

The results are reported in the order of the four main questions presented earlier and the significance level was set at $p \leq .05$.

INSERT TABLE 1 ABOUT HERE

Question One

The overall findings of the study indicated that many aspects of reading comprehension and writing ability were related. In order that the reader might get a feel for the type of data collected, a table of important means is provided (See Table 1). Correlation calculations computed on the three reading ability scores and writing quality scores were significantly correlated: r COMP = .45, p = .006; r PCTOT = .42, p = .01; r PropR = .36, p = .03). A statistically nonsignificant correlation was found between the total number of proposition recalled in reading and the total number of propositions produced in writing (r = .09; p = 0.6). Correlational calculations revealed that the only statistically significant correlated story grammar category to be recalled in reading and produced in writing

was internal reaction (r = .38, p = .02). The remaining six categories showed statistically nonsignificant relationships. Further correlation calculations indicated that inferential comprehension abilities in reading and evidence of story grammar elements in writing were related (r = .45, p = .0059) at a statistically significant level.

In response to question one, it would seem that while all measures of reading ability used here were valid predictors of writing quality, inferential probes were the best predictors of overall writing performance. Further, inferential probes were valid predictors of story grammar usage in writing. On the other hand, the propositional units and story grammar elements were not valid predictors of the reading/writing relationship when analyzed through correlation.

Question Two

Analysis of variance revealed that the subjects' writing ability was different from their production of story grammar categories, (F (1,35) = 4.57, p = 0.017) at a statistically significant level, whereas their reading ability was not (F (1,35) = 2.18, p = 0.129). Results of a follow-up t-test indicated that the high ability writing group was different in story grammar usage from both the middle and low ability groups, $t_{(35)}$ = 2.54, p .005; $t_{(35)}$ = 1.94, p .05, at a statistically significant level, respectively.

That is, those students who were more proficient writers tended to use their story grammar knowledge more efficiently in structuring their written products than did their less proficient counterparts, both average and low writing ability groups. This was not true of the most capable readers as their use of story grammar knowledge did not differ statistically from that

of their less capable counterparts.

INSERT TABLE 2 ABOUT HERE

Question Three

As shown in Table 2, correlation calculations revealed that all components of the writing scale were related to the overall writing quality score at a statistically significant level. Mechanics (r = .87, p = .0007) and story grammar category (r = .86, p = .0001) were the best predictors of writing ability results in that they accounted for 91% of the variance in writing scores.

Results of the factor analysis (maximum likelihood method with varimax rotation--SAS 82.4) in Table 3 indicate that two dimensions represented by style and characterization were being assessed by the analytic scale. Style evaluated originality of written content and selection of title and characterization was mainly concerned with the development of a central character within the written narrative. The remaining four components aligned themselves with one of these two dimensions.

INSERT TABLE 3 ABOUT HERE

Question Four

A qualitative analysis of student's story grammar usage indicated that while the most proficient readers recalled more propositions per story grammar category, it was the average ability writers who recalled and produced the greatest number of propositions when compared to the other two

groups. Analysis of syntactic complexity of the writings produced indicated that the most proficient writers' average T-unit length surpassed that of the average group by 3.3 words (H=10.7, A=7.4, L=7.6 words per T-unit). Analysis of the organization of propositions into story grammar categories in writing indicated that internal response, goal, attempt and end structures appeared less than once per story. Story grammar categories most frequently recalled per story included internal response (89%), setting (84%), and initiating event (82%). Those recalled least frequently were goal (54%) and attempt (59%). It would appear that the quantity of propositional units recalled and produced is not a valid indicator of reading and writing ability.

In addition, although use of story structure knowledge was apparent in the subjects' writings and readings, the frequency of usage varied according to the type of story grammar element and the task being performed (reading recall or written production).

DISCUSSION AND CONCLUSIONS

In addressing the four questions posed, the following four main conclusions were drawn based on the results of this study.

Reading comprehension measures and writing ability measures were significantly related. The subject's ability in responding to inferential probes on reading passages was the best predictor of writing ability and the ability to effectively use story structure in writing. The total number of proposition units was not an accurate predictor of either reading or writing ability. It may well be that the level of processing required in responding to inferential questions is similar to the depth processing required in forming macrostructures (Kintsch, 1977). Written language

production may well be a reciprocal act demanding an equal level of in-depth processing (as opposed to the task demands made in reading recall and written production). This leads to a need for caution in future research to ensure that task requirements are equated when comparing the various language processes.

The ability to recall story grammar elements during reading was not indicative of the ability to produce the same elements in writing. Further, writing ability but not reading ability, was a valid predictor of story structure production in writing. It was felt that knowledge of story structure had fully emerged in its influence on reading recall, but not on writing performance at the fourth grade level. Previous research has suggested that story structure usage is developmental (Hansche & Gordon, 1983; Mandler & Johnson, 1977). It would appear that the use of story schema in recalling text emerges well in advance of the use of story schema in producing text.

The mechanics and story grammar category components of the analytic writing scale were the best predictors of writing quality. It may well be that those fourth graders who have mastered the mechanical conventions of writing are also the ones who have developed efficient organizational patterns in story production. Of the writing aspects measured in this study, mechanics and story structure were the best correlates of writing quality. Many aspects of the writing process (awareness of audiences, teacher influence, social context), however, were not assessed in this study. These variables do not readily lend themselves to assessment, but may be equally influential in their impact on writing quality.

Good readers and good writers, as assessed by the number of proposit-

ions recalled in reading and produced in writing samples, are not necessarily one and the same. Moreover, fourth graders apparently used an internalized story schema, with varying levels of success, to aid in recalling and producing text. It may well be that less proficient writers have not fully developed the ability to incorporate all components of their internalized schema in their independent writings whereas even the

least proficient readers have developed their story schema knowledge to effectively aid reading recall.

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Table 1

Means and Standard Deviations of Dependent Variables*

Variable	Mean	S.D.	Minimum Score	Maximum Score
Comprehension	6.92	2.0	3.0	7.0
Propositions Recalled	22.44	4.1	15.0	29.0
Propositions Produced	40.64	18.4	17.0	99.0
Total Writing Score	32.08	6.4	19.0	46.0
Story Grammar Category	11.32	2.5	7.0	18.0
Mechanics	0.66	0.2	0.3	1.0
Sentence Structure	0.53	0.5	0.3	0.8
Style	0.55	0.1	0.3	0.7
Characterization	0.42	0.1	0.2	0.7
Word Usage	0.58	0.1	0.3	0.8

*n = 36

Table 2

Stepwise Regression for Writing Ability and the Components of the Analytic Scale*

Step	Variable	R	R_2	Significance	S.E.
1	Mechanics	.87	0.75	0.0001	3.2060
2	Story Grammar Category	.86	0.91	0.0001	0.1687
3	Sentence Structure	.86	0.95	0.0001	2.3972
4	Word Usage	.67	0.96	0.0001	2.7561
5	Style	.77	0.97	0.0001	2.5795
6	Characterization	.52	0.97	0.0001	2.1828

*n = 36

Table 3

Factor Analysis Computed on the Six Variables of the Analytic Writing Scale *

Variable	Factor 1	Factor 2
Style	.88	.09
Sentence Structure	.76	.35
Story Grammar Category	.73	.37
Mechanics	.63	.49
Characterization	.14	.81
Word Usage	.45	.58

*n = 36